IN THE SPECIFICATION:

The cited paragraphs below refer to the paragraphs identified in the Official Action by the paragraph numbers cited in U.S. Patent Application Publication No. 2005/0073702, which comprises the published version of the present application.

Kindly replace the paragraph beginning on page 5, line 25 with the following paragraph:

Figures 2a and 2b illustrate a signal and its ~~casual~~ causal output signals;

Kindly replace the paragraph beginning on page 6, line 9 with the following paragraph:

Figures 12a and 12b, respectively, illustrate[[s a]] cross sections of an edge and corresponding gradient functions;

Kindly replace the paragraph beginning on page 9, line 20 with the following paragraph:

when N is large, the computational complexity of the direct convolution might be prohibitive. However, the general formulation of the ~~casual~~ causal 1D IIR filter is

Kindly replace paragraph beginning on page 11, line 6 with the following paragraph:

Figure 3 presents the signal *S* 100', and a cascaded causal envelope *L* 130 (from (9))~~, which is much more like an envelope~~. Figure 3 also presents two other envelopes 140 and

150, which are created using different α parameters. Lower α values correspond to "more elastic" (and thus lower) envelopes.

Kindly replace the paragraph beginning on page 13, line 1 with the following paragraph:

The last stage in deriving the robust recursive Retinex algorithm 40 involves generalizing recursive filters to robust envelopes by revisiting the generalization of linear recursive filters to 2D. Figures 7b and 7c are respectively, the non-robust and robust envelopes (separable application of (9) and (11)) of the input image in Figure 7a. The envelope required by the Retinex algorithm 40 is such that major structures such as shadows and highlights are preserved in the envelope and can thus be corrected for, but details are removed. Making the envelope "posterized" leaves the depth and details in the reflectance image. In that respect, the robust envelope 170 (see Figure [[5]]<u>6</u>) is much better than the non-robust envelope 110 (see Figure 2a).

Kindly replace the paragraph beginning on page 1, line 10 with the following paragraph:

However, a closer look at the images reveals an inherent problem of the generalization to 2D. Figures 8a and 8b are a zoom in on the lower column shadow of the images in Figures 7a and 7c, respectively. As can be[[e]] seen in Figure 8b, the loss of detail of the robust envelope 170 is accompanied by artifacts in the Y direction.

Kindly replace the paragraph beginning on page 13, line 23 with the following paragraph:

A further difference between the robust and the non-robust envelopes can be seen by considering the recursive filter 40 in terms of information flow between pixel locations in the image. In the non-robust case, for each recursive pass (i.e., a forward pass and a backward pass in each dimension X and Y), information flows with the recursion along a row or column. In a 1D filter, every pixel receives information from pixels preceding that pixel (during the forward pass) and from pixels following that pixel (during a backward pass). In a 2D filter, information flows along pixel rows and then along pixel columns. This means that with the 2D filter, the Y filter operates on the results of the X filter[[()]]. Since the Y (column) filter operates on the result of the X (row) filter, in the 2D filter, every pixel "has access" to information from all the other pixels in the image. However, the information from one pixel (a source pixel) to another pixel (a destination pixel) flows in a single predetermined path--first along the row of the source pixel, and then along the column of the destination pixel.

Kindly replace the paragraph beginning on page 18, line 9 with the following paragraph:

What makes the above rule scale independent is the use of the term "total variation" instead of gradient. Considering the example illustrated in Figure<u>s</u> 12<u>a and 12b</u>, a cross section of an edge is plotted in Figure 12a at four scales (the X axis is in coarse scale units). Figure 12b illustrates gradient functions of the four cross sections, where for each scale the solid straight line is the corresponding X axis, and the dotted line is a T=-5 threshold. At

larger scales, the edge stretches over a larger number of pixels, and consequently the gradient at each location is smaller. Due to fine details or noise, the edges become dominant in the gradient function, whereas the gradient at the real edge will drop below any threshold. The total variation of the edge (the difference between its left and right sides in Figure 12a) is, however, constant throughout the scale space, and thus scale independent.

Kindly replace the paragraph beginning on page 21, line 18 with the following paragraph:

Figures 17a-17d show[[s]] a comparison the robust recursive envelope filters of the Retinex algorithm 40 to an alternative Retinex method. A pyramidal solution to a variational formulation of the robust envelope extraction problem has linear complexity (see Table 1 above). However, due to the iterative nature of the differential equation solved in each of the pyramidal layers, the constant is relatively large. For images of 1M pixels, the execution time for the Retinex algorithm 40 is about half that of the pyramidal method.

Kindly replace the paragraph beginning on page 21, line 24 with the following paragraph:

Figures 17a and 17b show[[s]] the envelopes and the corresponding Retinex enhancements for the Retinex algorithm 40 and the pyramidal Retinex, side by side. In both methods, envelopes are, as required, smooth and robust. Nevertheless, differences exist between the methods.

Kindly replace the paragraph beginning on page 21, line 28 with the following paragraph:

The pyramidal Retinex is scale invariant in the global sense. That is, the nature of the envelope image does not depend on the size of the input image. However, the pyramidal Retinex algorithm is not locally scale invariant, meaning that features of different size in the image are treated differently, and specifically, the smaller a feature is, the more the feature is treated as detail rather than as a feature. The image<u>s</u> in Figure<u>s</u> 17<u>a-17d are</u> [[is an]] example<u>s</u> where the illumination for each of the column shadows is corrected differently according to its width.